



Winter Outlook 2013-2014



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NWS Chicago- Romeoville, IL
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“Average” Winter (1981-2010)

- **December-February Average Temperature**

- **24-27 degrees**

- **Average daily highs start around 40 and dip to near 30 in January, then recover back to near 40 by the end of February.**

- **Average daily lows start in the low to mid 20s and dip to the mid teens in January, then recover back into the low to mid 20s by the end of February.**

- **December-February Average Precipitation**

- **4-6 inches**

- **December-February Average Snowfall**

- **Around 29 inches**

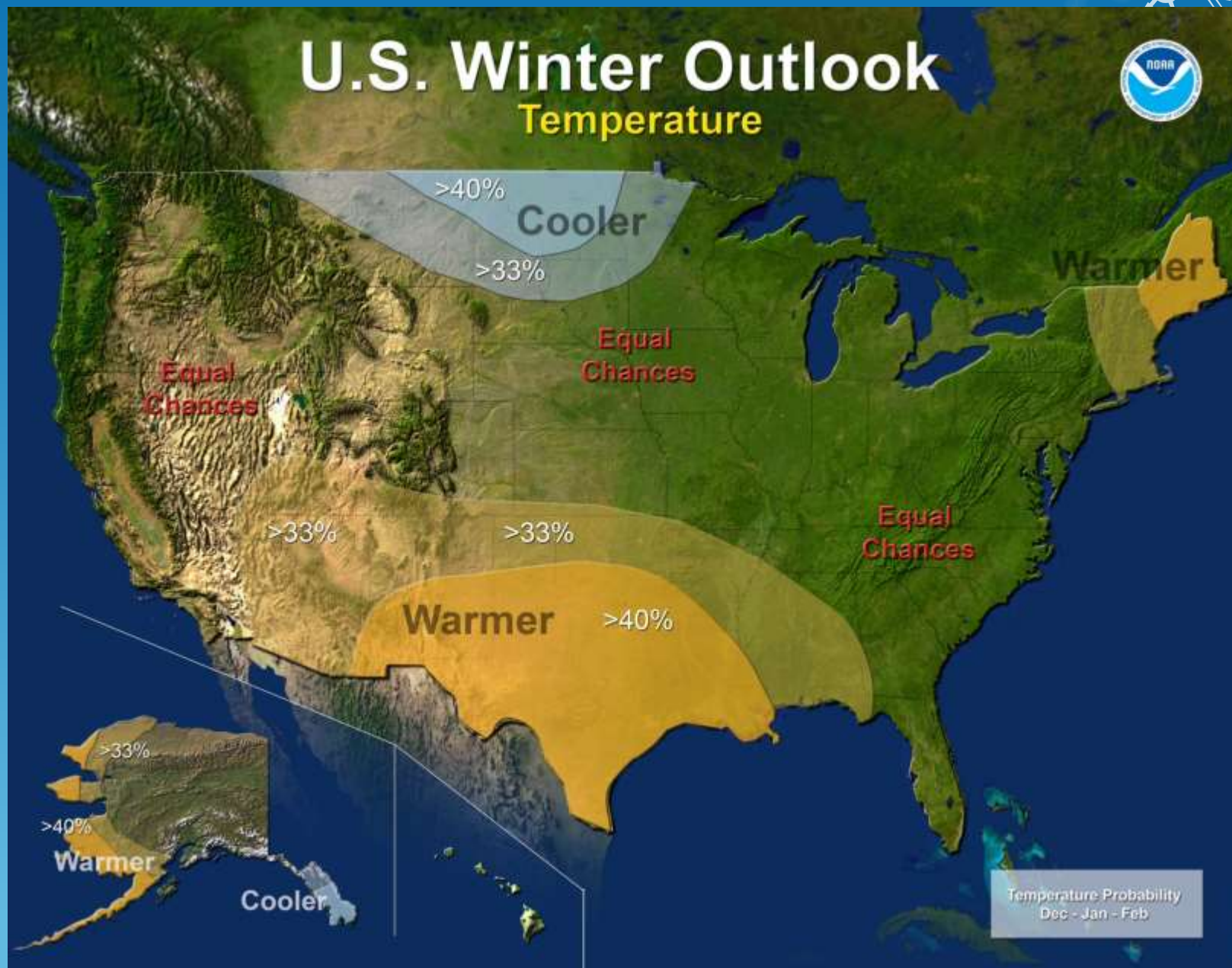
- **Average Yearly Total Snowfall (July-June)**

- **Around 37 inches**

What does Average Really Mean?

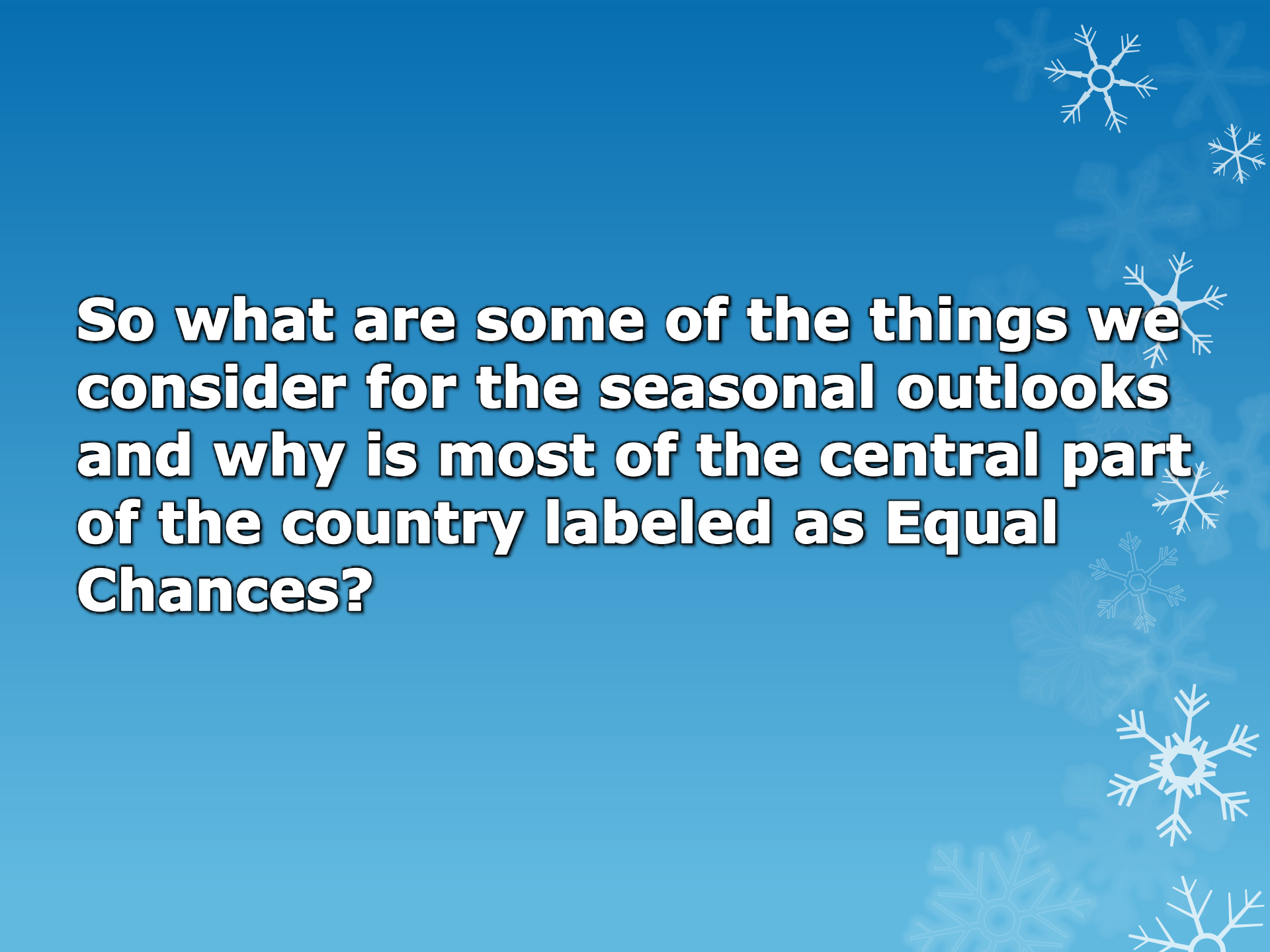
- In the winter, you're really averaging out a series of temperature extremes
- Variability typically is the rule rather than the exception
- Snowfall is even more volatile than temperatures
- So, if a winter comes out averaging within a degree or two either side of average, the winter is close to average- it likely had cold periods mixed with milder periods
- Good snowfall example: take away the 21.2" from 1/31-2/2/11 and the rest of 2010-2011 had exactly normal, 36.7", of snow for the season in Chicago.

Official CPC Outlook



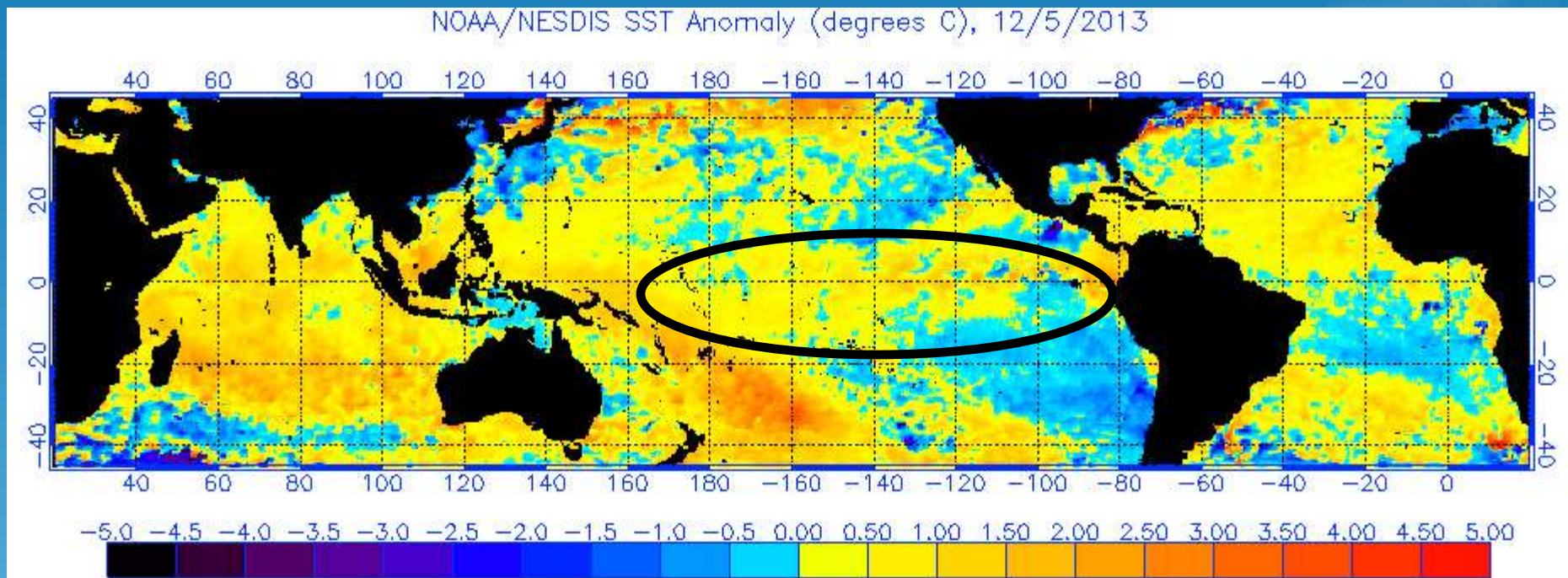
Official CPC Outlook



The background is a solid blue color. Scattered across the right side and bottom are several white snowflake icons of varying sizes and orientations. Some are sharp and prominent, while others are faded and serve as a subtle pattern.

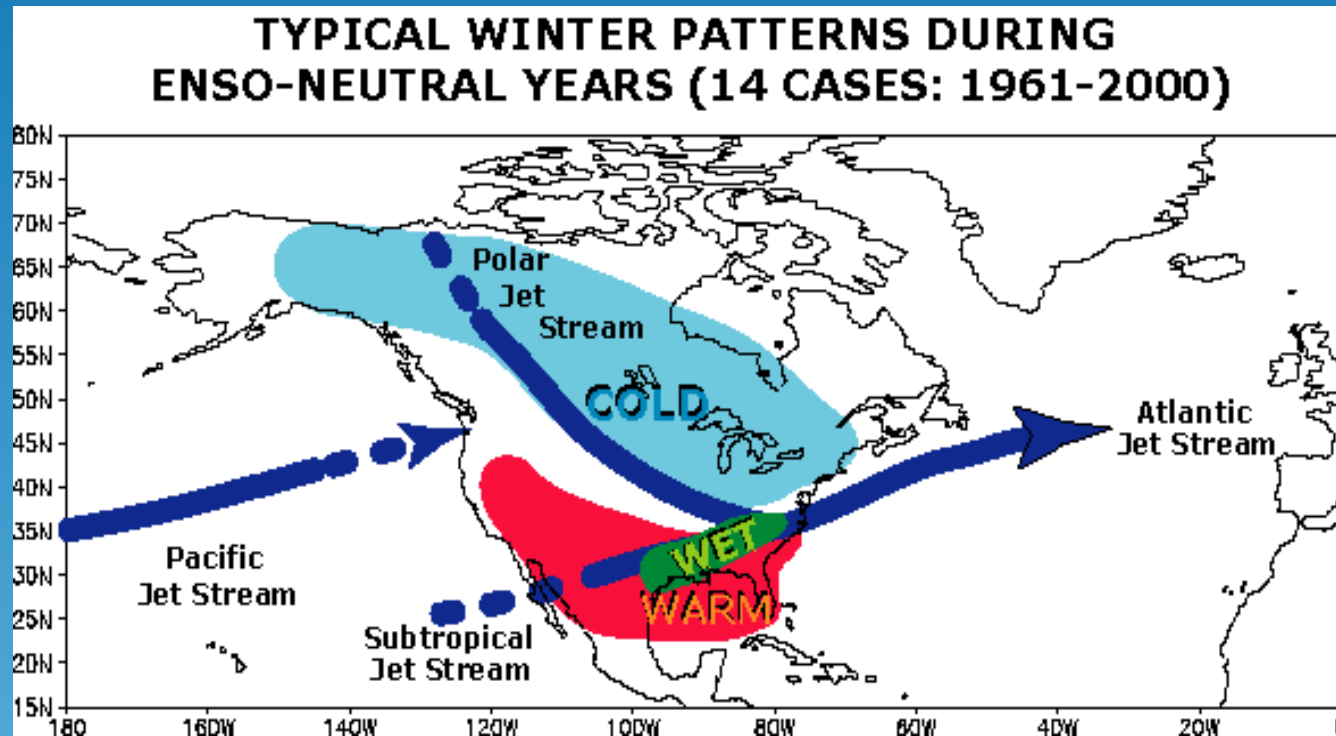
So what are some of the things we consider for the seasonal outlooks and why is most of the central part of the country labeled as Equal Chances?

1. The El Niño Southern Oscillation (ENSO)



There is no dominant ENSO signal in the Tropical Pacific. Sea Surface temperatures are near normal, so ENSO Neutral conditions are in place. This is expected to be the case through the winter season.

Typical ENSO Neutral Pattern



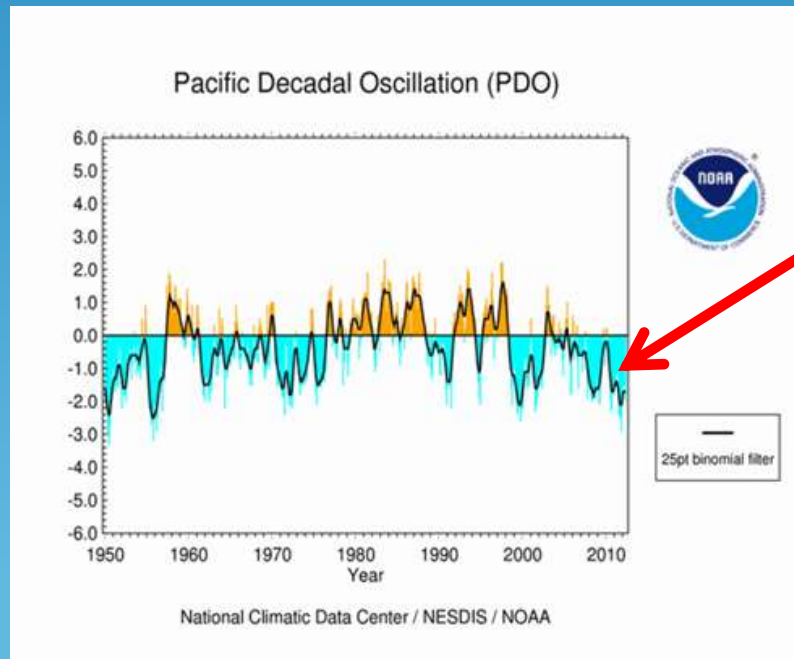
Coldest air over northern tier and warmer with active storm track to the south

***Note that this pattern can vary significantly due to other factors.**

2. The PDO

○ PDO – Stands for the Pacific Decadal Oscillation.

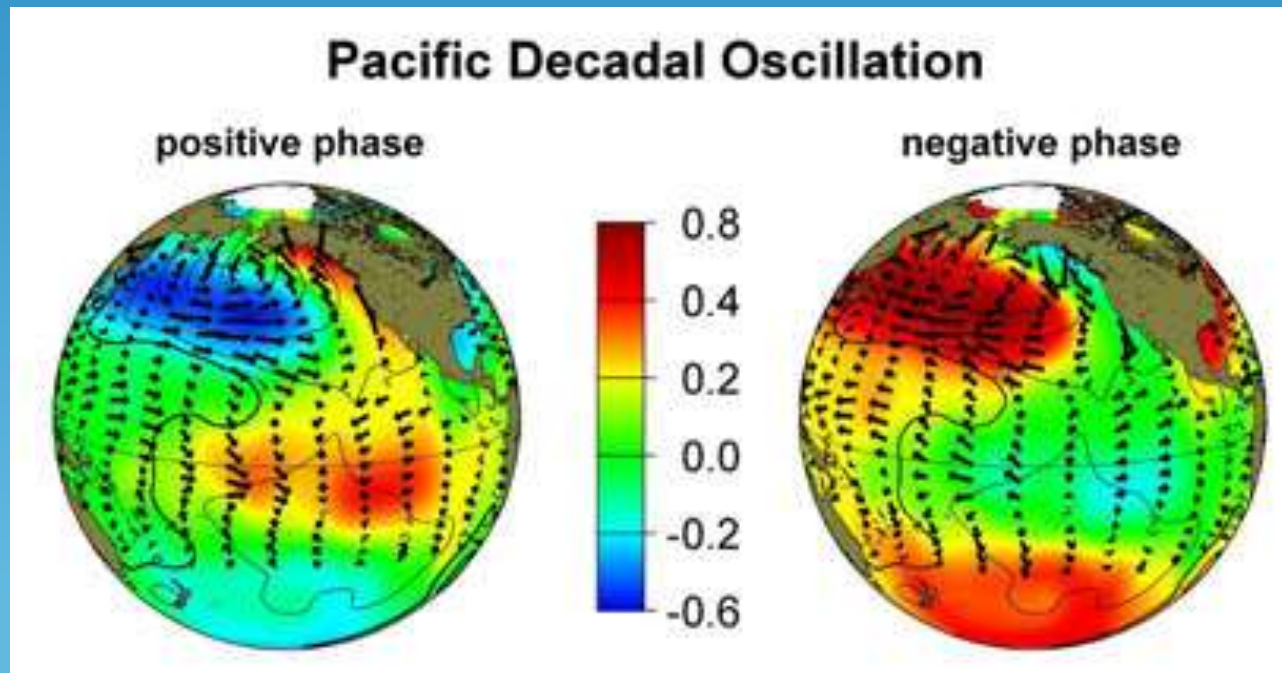
→ **Is an ENSO-like oscillation of water temperatures that occurs over a 15 to 25 year and a 50-70 year time period within the northern Pacific Ocean basin.**



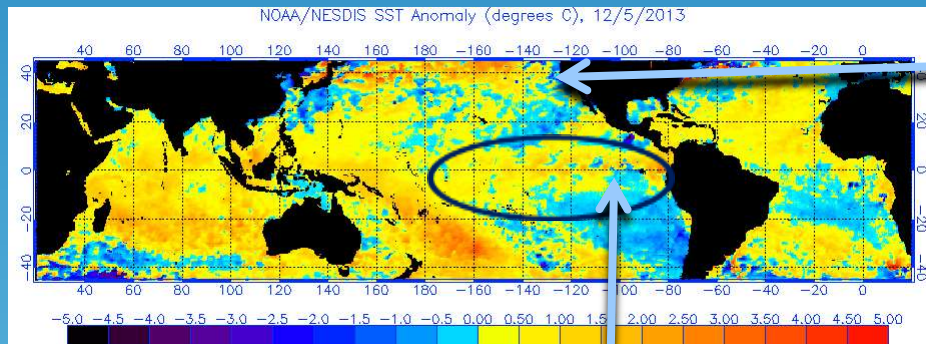
We are currently in the negative phase of the PDO

○ There are two phases of PDO, these are:

1. **+PDO** → is the warm phase of the PDO and is characterized by cold western and central north Pacific waters and warm eastern Pacific Ocean waters (similar to a prolonged El Nino event in the North Pacific).
2. **-PDO** → is the cool phase of PDO and is characterized by warm western and central north Pacific waters and cool eastern Pacific Ocean waters (similar to a prolonged La Nina event in the North Pacific).



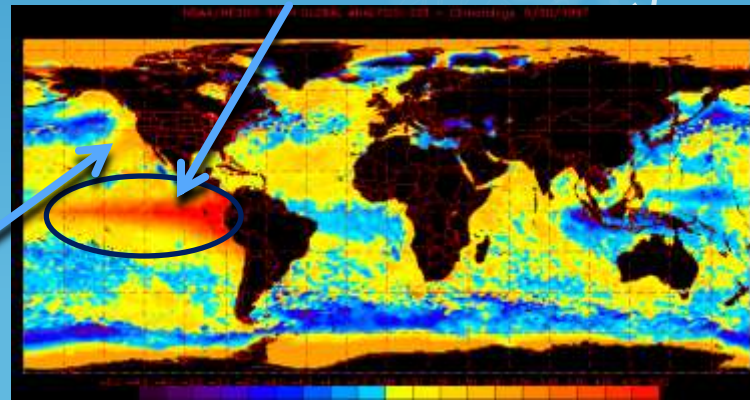
- In General, Constructive interference occurs when ENSO events are in phase with the PDO.
- El Niño events → stronger impact during the +PDO.
- La Niña events → stronger impact during the -PDO.
- These stronger events tend to have a greater influence on local climate parameters.



Near Normal Sea Surface Temperatures
(ENSO Neutral)

Negative PDO
signal

September 1997 Record El Niño event

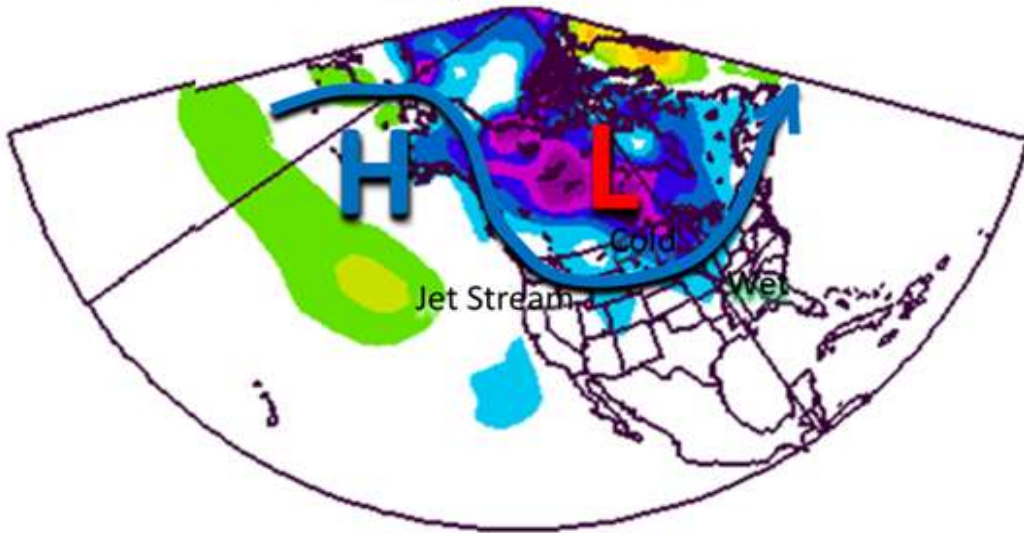


Positive PDO
signal

Average Storm Tracks During +/-PDO ENSO Neutral Winters



Winters During Negative PDO ENSO Neutral



-PDO ENSO Neutral Winters

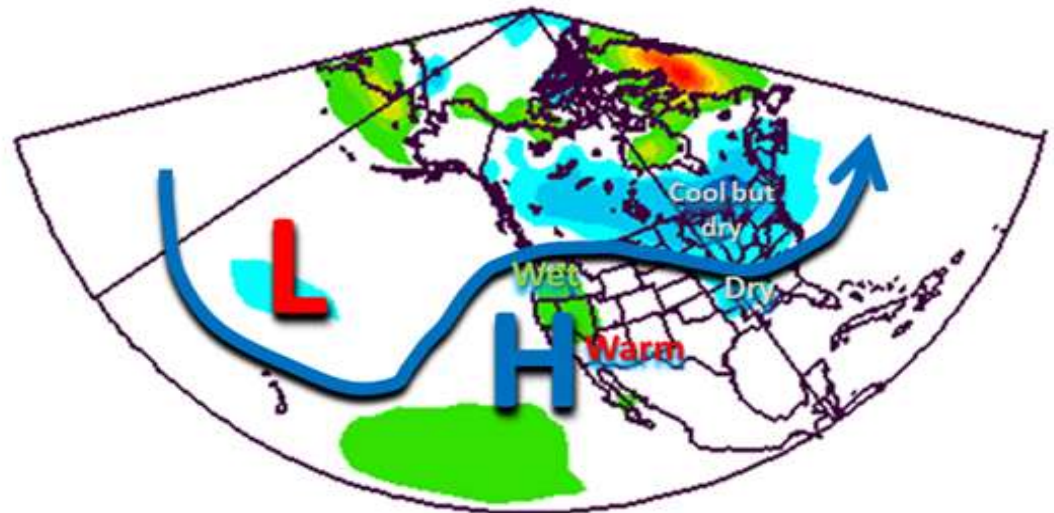
- Tendency for more persistent North Pacific Blocking High pressure.
- The winter storm track can be driven southward across the northern CONUS.
- Above average precipitation can be favored across the lower Ohio and Tennessee valleys.
- Below normal temperatures, with more arctic outbreaks, are favored across the northern CONUS.
- This pattern can bring colder and snowier conditions to the local region, but there is no significant signal to suggest this to be the rule.



+PDO ENSO Neutral Winters

- Tendency for low pressure across the Pacific and high pressure across the western CONUS.
- This drives a weaker storm track across the central CONUS.
- Below average precipitation is favored across the lower Ohio and Tennessee valleys.
- Slightly cooler than normal temperatures are favored across the northern CONUS.

Winters During Positive PDO ENSO Neutral



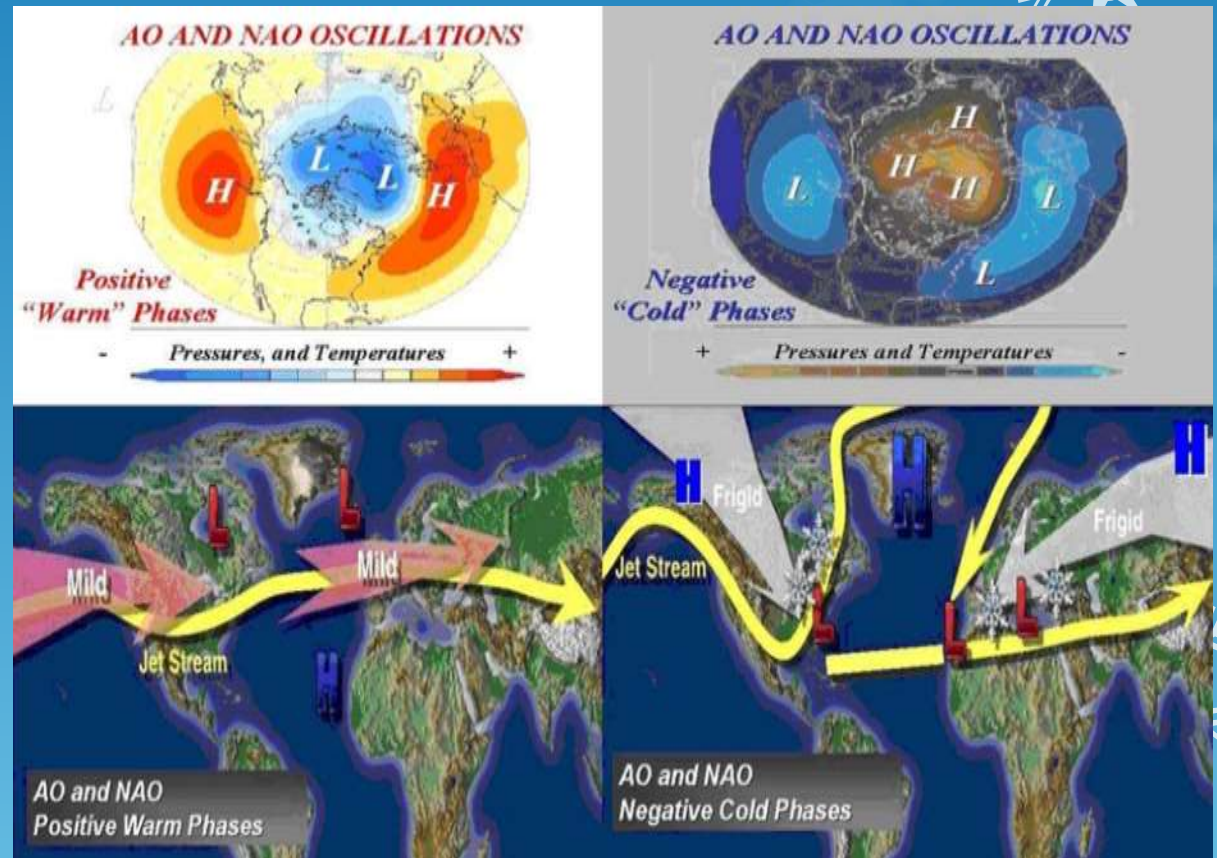
3. The North Atlantic and Arctic Oscillation (NAO/AO)

- Is a wild card this winter.
- Could prove to be the difference between a mild or colder winter.
 - Is a north to south dipole pattern of atmospheric pressure anomalies of opposite sign across the North Atlantic and Arctic.
 - Has periods of variability ranging from intraseasonal to interdecadal.
 - ***Highly unpredictable more than a few weeks out, though new research within the past few years is promising in terms of predictability of the predominant seasonal scale AO/NAO pattern.***

The North Atlantic and Arctic Oscillation (NAO/AO)

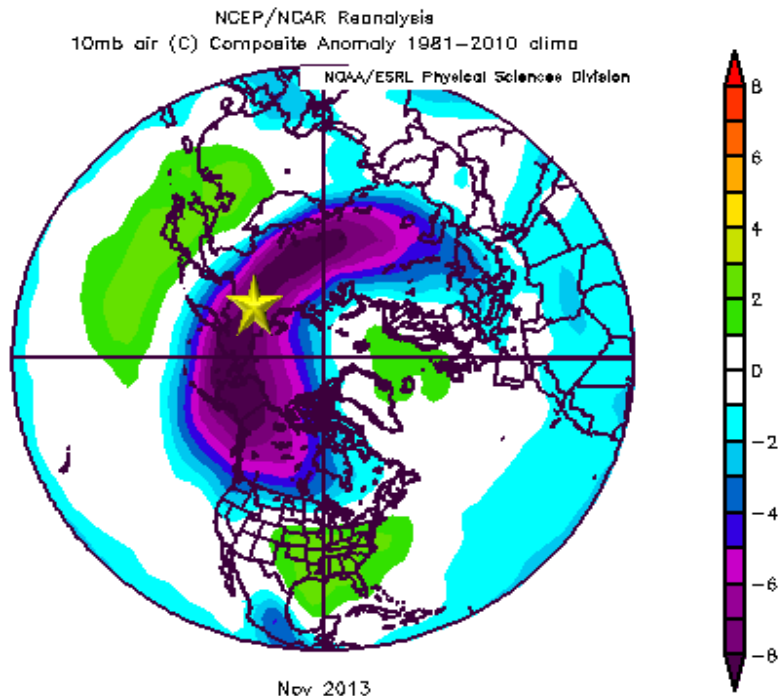
- Consists of the positive and the negative phases shown in the image below.

- Negative phase favors more arctic outbreaks with colder than normal conditions and more snowfall across the eastern half of the country.
- Positive phase favors warmer and drier conditions across the eastern half of the country.



Some indicators that AO/NAO could average positive for the winter

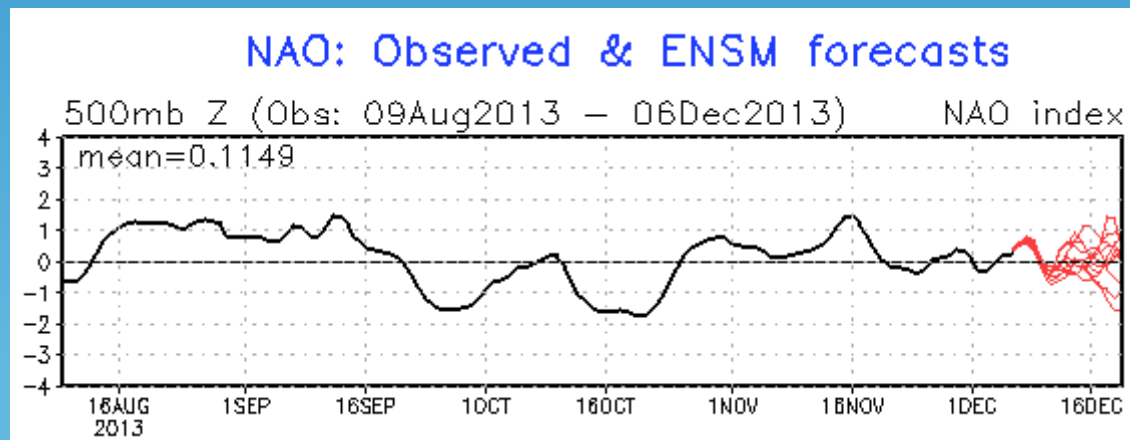
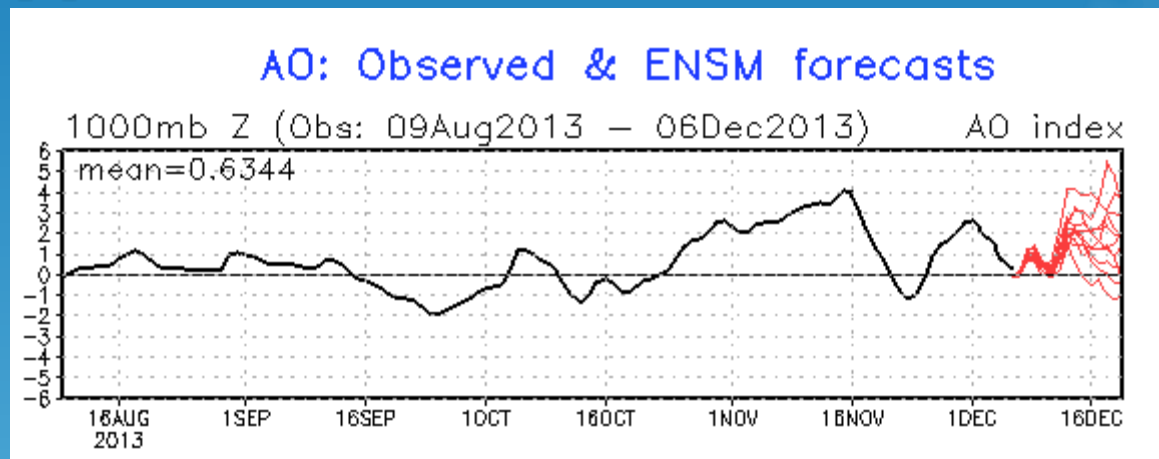
- **Colder than normal stratosphere (temperatures around 90,000 Feet) over Siberia may favor a predominantly positive AO/NAO through the winter.**



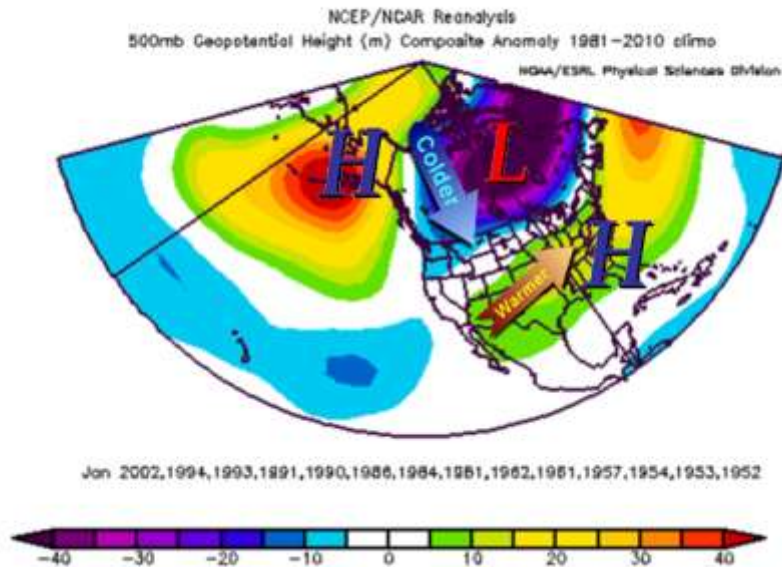
- **A colder stratosphere tends to support a stronger polar vortex (large area of low pressure across the high latitudes).**
- **A strong polar vortex tends to support a +AO/+NAO and locks in most of winter's deep cold across the high latitudes, and thus prolonged cold periods can be limited across the country.**

Some indicators that AO/NAO could average positive for the winter

- AO and NAO have been primarily positive and frequently strongly positive this fall



Northern Illinois/NW Indiana During ENSO Neutral/+NAO Winters



+NAO Neutral Anomalies

Temperature Snowfall

Dec +0.7 -4.1"

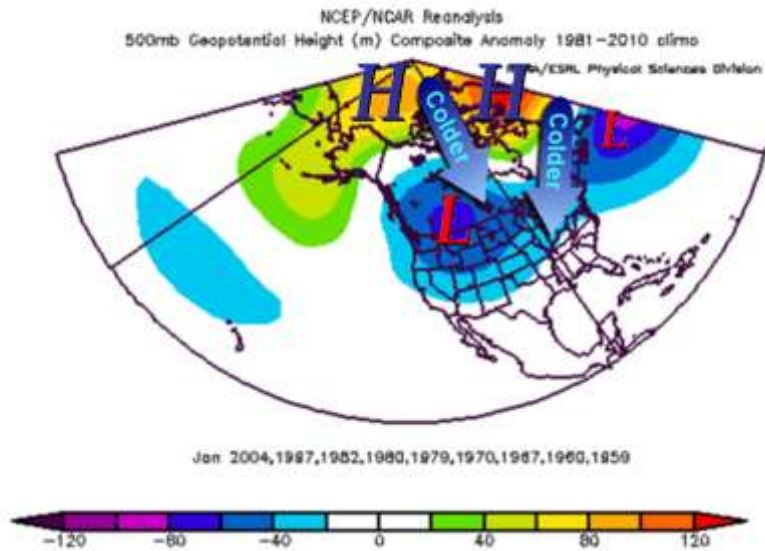
Jan +0.8 -1.7"

Feb +0.4 +0.8"

Overall, there is no significant tendency for above or below average winter monthly temperatures or snowfall during Neutral ENSO conditions in conjunction with predominately +NAO. Colder conditions tend to be favored north and warmer than normal conditions south.

-> However, a predominantly +AO/NAO can increase our chances for warmer than average conditions.

Northern Illinois during ENSO Neutral/-NAO Winters



- NAO Neutral Anomalies Temperatures Snowfall

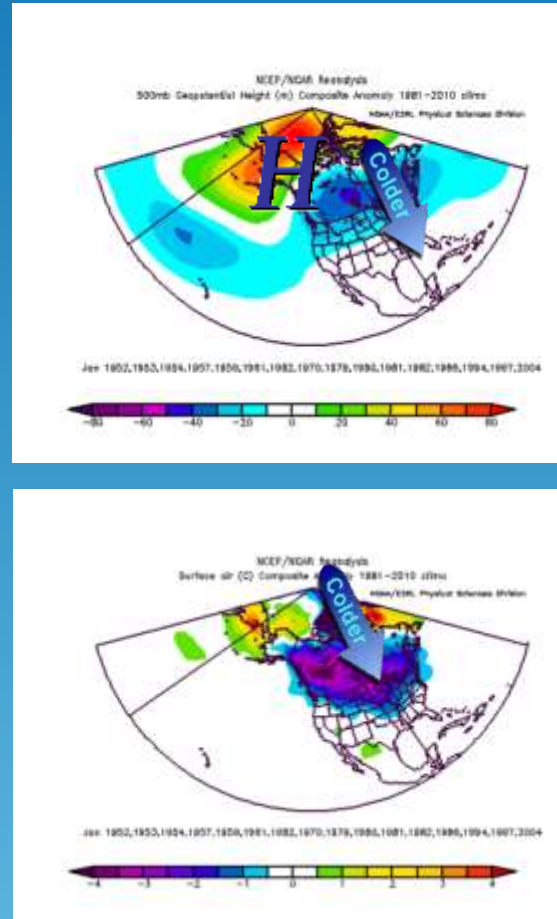
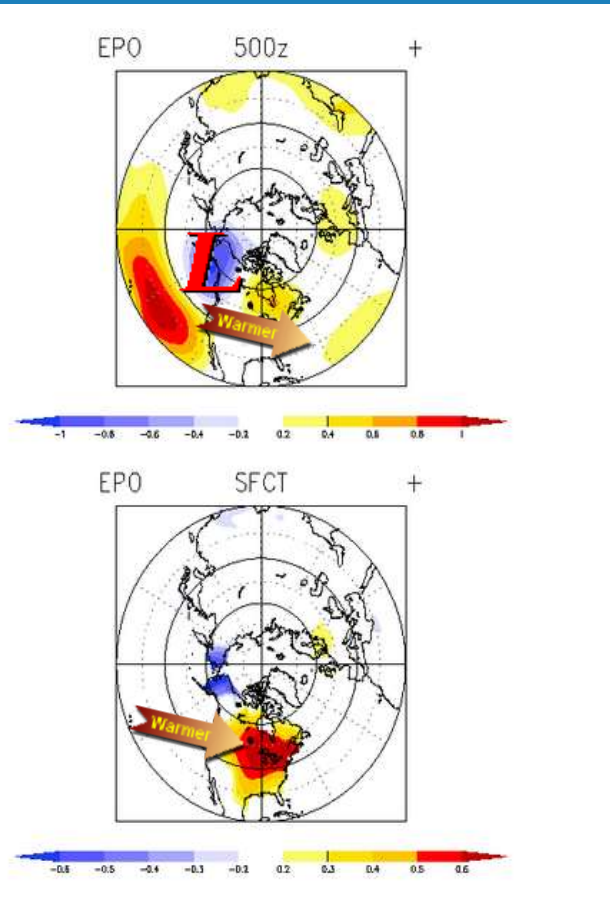
Dec	-0.7	-0.8"
Jan	-3.2	+6.5"
Feb	-2.2	+0.8"

Overall, ENSO Neutral events dominated by a -AO/NAO have a good tendency to produce below average temperatures across the area. There is no significant tendency for above or below average snowfall, except perhaps during January. However, this pattern could support more snow events across the central CONUS.

Another Wild Card: Upper Level Pattern Near Alaska

Also known as East Pacific Oscillation (EPO)

Tendency this fall has been for higher pressure near Alaska (-EPO)



- **Persistent strong high pressure over and near Alaska (-EPO) can act to drive deeper cold southward across the area from Canada.**

- **This is ongoing currently, and is leading to the very cold conditions across the area.**

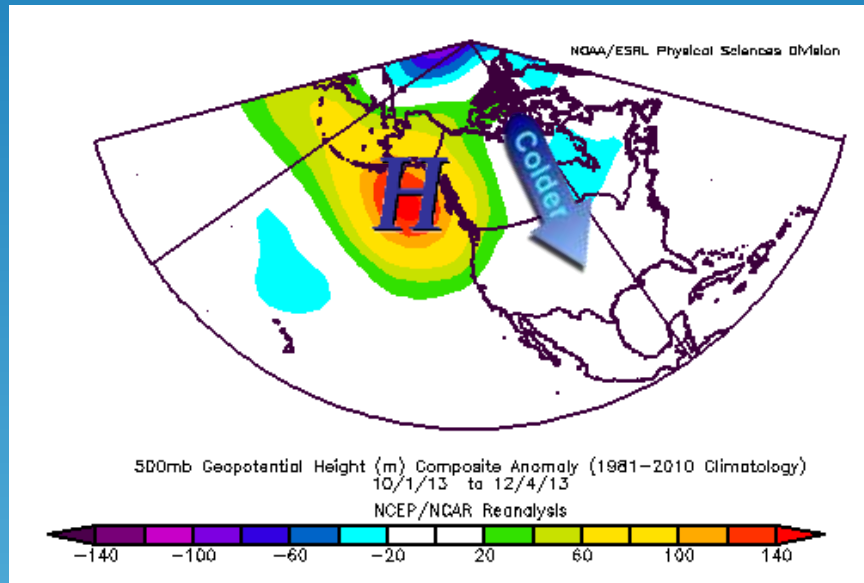
- **However, persistent strong low pressure over and near Alaska (+EPO) can result in more Pacific type air masses moving across the U.S., which favors warmer conditions.**

Low Pressure near/over Alaska (+EPO)

High Pressure near/over Alaska (-EPO)

Another Wild Card: Upper Level Pattern Near Alaska

Tendency this fall has been for higher pressure (-EPO) near Alaska



This figure shows the upper level pressure pattern from October through early December.

- **Higher than normal pressure has dominated near Alaska and this has led to some periods of below normal temperatures.**
- **The big question is: how long will this pattern hold?**
 - **It appears this pattern may hold on through the first half of the month, and this could to support a colder than normal month across area, if it persists long enough.**

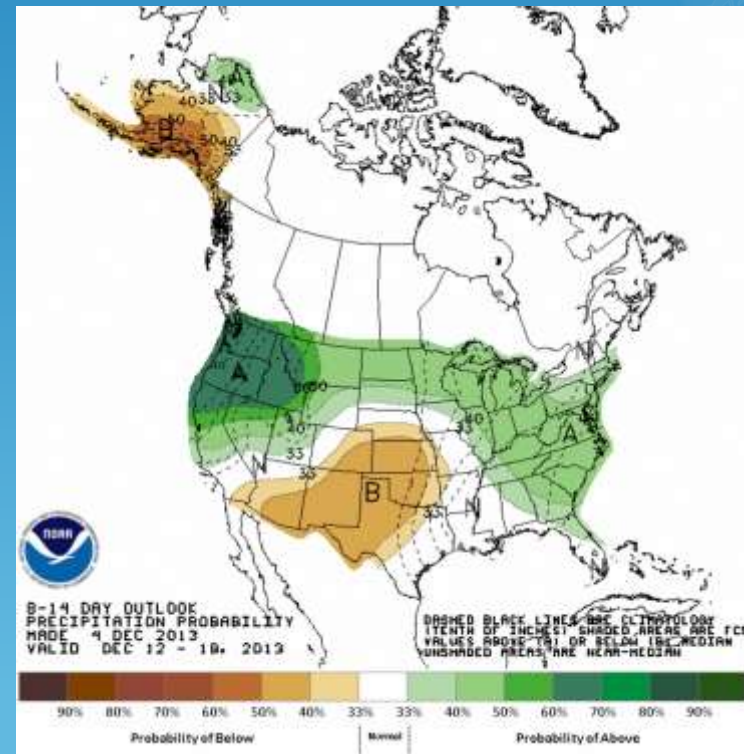
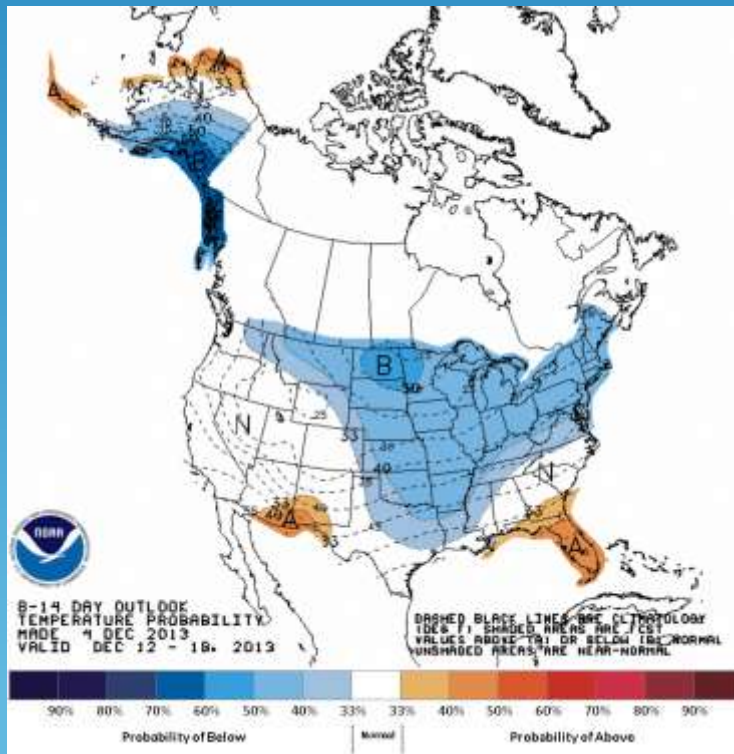
***If this pattern of having strong high pressure across Alaska breaks down, the decent prospects of a predominantly positive AO/NAO could result in moderating temperatures later in the winter season.**

Local Data for -/+ EPO Patterns

Chicago, IL	<i>All Years</i>	<i>(-EPO)</i>	<i>(+EPO)</i>
<i>Temperatures</i>	<i>Average</i>	<i>"Alaska Ridge"</i>	<i>"Alaska Trough"</i>
December	28.6°F		
January	24.3°F	-2.7°F	+3.5°F
February	27.1°F	-3.8°F	+1.9°F
Winter Season	26.7°F		

What Can We Expect For December?

- Strong upper level high pressure near Alaska will favor colder than average conditions for at least the next couple of weeks (through at least mid December). There will also be better chances for a couple of storm systems across the central CONUS into the middle of December with this pattern.



What Can We Expect for the Winter season?




Later in the Season (January and February) confidence is lower due to the weak signals discussed.

○ Temperatures






○ A –PDO in combination with ENSO Neutral conditions suggests a slight tendency for near to a bit below average temperatures across the area.

○ However, if we end up with a predominantly +AO/NAO this winter, the signal for temperatures locally is weak, but this would be more favorable for near to slightly above normal conditions.




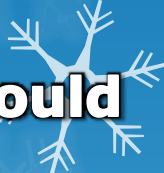



○ A predominantly –AO/NAO would increase our chances a colder than normal winter. This doesn't appear to be likely at this time.



What Can We Expect for the Winter season?



○ Temperatures Continued

- As is typical for Midwest winters, expect notable warm periods and possibly significant cold periods.
 - Potential for very significant cold periods and possibly below normal temperatures overall would increase if the tendency for upper level high pressure (-EPO) near Alaska continues.
 - Potential for significant warm periods if +AO/+NAO is coupled with strong upper level low pressure over or near Alaska (+EPO)
 - Snow cover leads to colder days relative to areas void of snow.
 - Overall, the lack of clear large scale signals in the January- February time frame led to the Equal chances forecast by the CPC. Even though we will be colder than average through mid to late December, this doesn't mean the whole winter will be like this.
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What Can We Expect Through the Winter?

Overall

○ Precipitation and Snowfall

- A –PDO in combination with ENSO Neutral conditions suggests a slight tendency for near to above average snowfall across the area.**
 - However, if we end up with a predominantly +AO/NAO this winter, the signal for above or below average snowfall is very weak, likely due to the potential for warmer conditions.**
- Potential for active storm track near our area and amount of snow will be dictated by track of individual systems→ whether we are on warm or cold side of storm track.**
- All it takes is a few big events to have a memorable winter in terms of snow.**
- Or we could have normal to above normal precipitation but poor track/timing could lead to less snow than normal.**
- These weak signals are the reason for Equal chances for above below and near normal precipitation being forecast for the area by the CPC.**

THANKS FOR READING!

**If you have any questions,
email our Web Master:
w-lot.webmaster@noaa.gov**